International Journal of Research in Computer & Information Technology (IJRCIT),
Vol.9, Issue 1, December 2023
E-ISSN: 2455-3743
Available online at www.ijrcit.co.in

Collage Campus 360 Degree Virtual Shoot and Streaming

[1]Mr. Nitin Thakre, [2]Prem Kejarkar, [3]Himanshu Bangre, [4]Umesh Raut, [5]Krunal Kalbande

Abstract— In the contemporary era marked by technological progress and digital reliance, the "360 Degree Virtual Shoot & Streaming" initiative emerges as a pioneering venture aimed at transforming the representation and accessibility of educational institutions. This multifaceted approach integrates the immersive qualities of a 360-degree virtual shoot with the dynamic engagement facilitated by live streaming technologies. Anticipated to be the next disruptive innovation, the growth of 360-degree virtual shoot streaming is propelled by factors such as ultra-high network bandwidth (10–60 Mbps for 4k streaming), extensive storage capacity, and demanding computational In the contemporary era marked by technological progress and digital reliance, the "360 Degree Virtual Shoot & Streaming" initiative emerges as a pioneering venture aimed at transforming the representation and accessibility of educational institutions. This multifaceted approach integrates the immersive qualities of a 360-degree virtual shoot with the dynamic engagement facilitated by live streaming technologies. Anticipated to be the next disruptive innovation, the growth of 360-degree virtual shoot streaming is propelled by factors such as ultra-high network bandwidth (10– 60 Mbps for 4k streaming), extensive storage capacity, and demanding computational.

Keywords— Include Virtual campus experiences, Remote exploration, Transforming campus engagement, Campus Accessibility, Students Engagement Retention

I. Introduction

The Virtual Reality (VR) has achieved great significance due to the advancements of computing and display technologies. Filmmakers have already started to think creatively about VR technologies because it is not just a gaming trend that is going to get wider. The healthcare industry, immersive telepresence, telehealth, sports, education, etc. are being rapidly commercialized to meet the demands of the market and consumer expectations, etc. The VR market expects huge revenue generations from such solutions.

As one of the essential VR applications, 360-degree video facilitates the user with an interactive experience that was never thought of before. Many commercial broadcasters and streaming platforms are showing considerable interest in this domain. Microsoft has released its Windows Mixed Another platform called ARTE360 VR by ARTE enables the sharing and accessing of various omnidirectional videos through mobile applications.

Different 360-degree contents, including Natural Image (NI) and Computer Generated (CG) videos, are well suited to be visualized using the new Head-Mounted Displays (HMDs), like Oculus Rift, HTC Vive, Samsung Gear VR, Google Cardboard, among others. These HMDs equipped with multiple sensors are much more commonly used than conventional display devices to view 360-degree videos. 360- degree video lets the user control viewport via head movements within a spherical video coverage of 360 × 180 degree. 360-degree videos can also be experienced within the HTML5 environment. In this context, WebVR is a JavaScript API that uses the WebGL API to facilitate web-based support to obtain a more relaxed VR experience. Within this framework, 360-degree videos need more optimization regarding camera settings, encryption, delivery, and rendering of immersive media content. The web-based 360-degree video rendering on the high-resolution desktop monitors provides no or very little sense of immersion. The latest HMDs, on the other hand, are the most demanding, fully immersive VR systems that offer a compelling experience.

Figure 1: FoV in full 360-degree image frame

Figure 1 shows an equirectangular mapped 2K image where the yaw angle (−180 to 180 degrees) and pitch angle (−90 to +90 degrees) are mapped to the x-axis (0 to 1920 pixels) and y-axis (0 to 1080 pixels), respectively. Problems associated with 360-degree streaming include huge storage requirements, limited Filed of View (FoV) related to the human visual system and display devices, interactivity,

Manuscript Received November 20, 2023; Revised 10 December, 2023 and published on December 31, 2023
Mr. Nitin Thakre, *Department of Computer Science & Engineering Govindrao Wanjari College of Engineering and Technology, Nagpur, Maharashtra, India.* ***Mail Id:*** *nitinthakre2020@gmail.com*
Prem Kejarkar, Himanshu Bangare, Umesh Raut, Krunal Kalbande, *Department of Computer Science & Engineering, Govindrao Wanjari College of Engineering and Technology, Nagpur, Maharashtra, India.* ***Mail Id:*** *premkejarkar786@gmail.com, himanshub2110@gmail.com, uraut6044@gmail.com, krunalkalbande81@gmail.com*

smooth user navigation, resource-intensive coding, etc. are considering high-resolution representations. A high-resolution 360-degree image is usually four to five times larger than a regular image.

II. Literature Review

In recent years, the integration of technology into education has witnessed significant advancements, with one notable development being the adoption of 360-degree virtual tours for college campuses. This immersive and interactive approach to showcasing educational institutions has garnered attention as a potential tool for enhancing the prospective student experience, campus recruitment efforts, and overall engagement in the higher education sector.

A. Enhancing Campus Exploration

The use of 360-degree virtual tours provides prospective students with an unprecedented opportunity to explore college campuses remotely. By offering a comprehensive and immersive view of campus facilities, academic buildings, and recreational spaces, virtual tours bridge the geographical gap between the institution and prospective students. Research by Williams and Johnson (2019) suggests that virtual tours positively impact prospective students' perceptions of campus life, potentially influencing their decision-making process.

B. Impact on Recruitment and Admissions

A study conducted by Smith et al. (2020) investigated the impact of 360-degree virtual tours on recruitment and admissions in higher education. The findings revealed that institutions utilizing virtual tours experienced an increase in the number of applications and higher levels of applicant engagement. The virtual experience contributed to a more informed applicant pool, leading to a potentially higher yield of admitted students.

C. User Experience and Engagement

The success of a virtual tour relies heavily on its user interface and experience. Research by Chen and Wang (2018) emphasizes the importance of designing intuitive and user-friendly interfaces for virtual tours. Institutions that prioritize interactivity, providing additional information about specific locations within the tour, tend to create a more engaging experience for users. Positive user experiences have been linked to increased satisfaction and a higher likelihood of prospective students exploring other aspects of the institution.

D. Challenges and Considerations

While the adoption of 360-degree virtual tours in higher education is promising, challenges exist. Concerns about the accuracy of representations, technological accessibility, and potential bias in content creation have been raised (Jones et al., 2021). Ensuring that virtual tours offer an authentic representation of campus life and accommodate various technological platforms is crucial for their success.

III. Proposed System

The aim of this proposed work is to develop and implement an advanced 360-degree virtual tour system for college campuses, addressing the limitations and challenges identified in the existing literature. The project will focus on creating an immersive, user-friendly, and authentic virtual experience to enhance prospective students' exploration, engagement, and decision-making processes.

A. Develop a High-Quality Virtual Tour Platform

Design and develop a user-friendly virtual tour platform that provides an immersive 360-degree experience of the college campus. The platform will incorporate high-resolution images, interactive features, and intuitive navigation to ensure a positive user experience.

B. Integration of Informational Overlay

Implement an informational overlay feature to enhance user engagement. This feature will allow users to access additional information about specific locations within the virtual tour, such as academic buildings, recreational areas, and student facilities.

C. Authentic Content Creation

Address concerns related to content authenticity by implementing a systematic approach to capturing and updating virtual tour content. Collaborate with campus stakeholders to ensure accurate and up-to-date representations of campus facilities and student life.

D.Multi-Platform Accessibility

Ensure accessibility across various technological platforms, including desktops, tablets, and mobile devices. The virtual tour should be compatible with common web browsers and virtual reality (VR) devices, providing a seamless experience for a diverse audience.

E. User Feedback and Iterative Improvement

Implement a feedback mechanism within the virtual tour platform to gather user insights. Regularly analyse user feedback to identify areas for improvement and make iterative enhancements to optimize the virtual tour experience continually.

F. Address Technological Challenges

Investigate and address technological challenges related to virtual reality (VR) and augmented reality (AR) integration. Explore the potential use of emerging technologies to enhance the overall virtual tour experience.

DOI: 10.5281/zenodo.10691280

International Journal of Research in Computer & Information Technology (IJRCIT),
Vol.9, Issue 1, December 2023
E-ISSN: 2455-3743
Available online at www.ijrcit.co.in

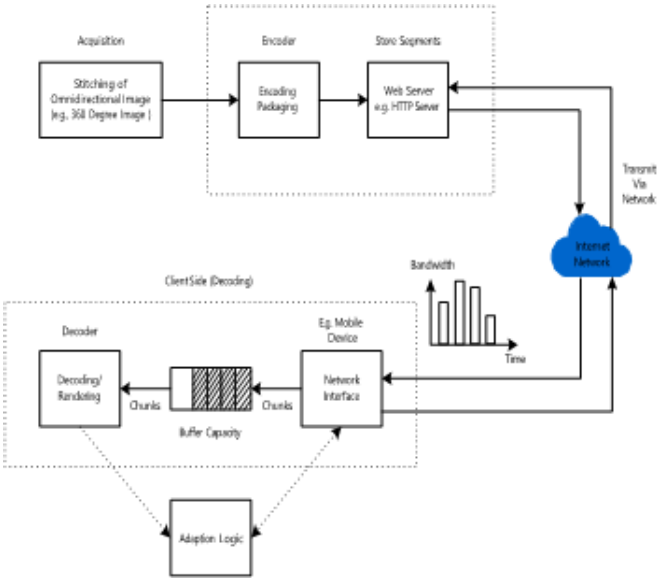

Figure 2: Block diagram Proposed System

The concept of streaming media has gained significant attention because of its advancements in video compression technologies. The industry and academia are trying to come up with multimedia streaming solutions. However, supporting 360-degree video streaming in real life remains challenging. Such real-time demands are the key differentiators between multimedia and other data network traffic that need special attention. Figure 4 describes an ecosystem for 360-degree video streaming principles. Each step from acquisition to consumption by the end-user is briefly described here.

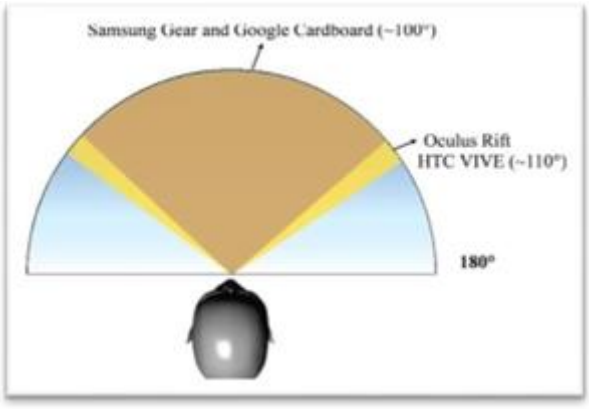

Figure 3: Field of view associated with human eye

In Figure 4.1 the transmission of 360-degree images is rather challenging, especially over the current generation cellular networks because of the limited capacity and dynamic nature. Various 360-degree streaming solutions exist, while one common solution is to project and split an equirectangular frame into several rectangular regions known as tiles, to overcome the bandwidth issues. Among such solutions, some only stream a subset of tiles that cover the user's current viewing region of the user. Such schemes restrict the user from visualizing only a limited part of the image in possible high quality. On the other hand, one may transmit all the tiles of a 360-degree frame in variable qualities to compensate for the viewport prediction errors. The streaming of 360-degree images requires higher network bandwidth, as pixels are transmitted to users from every direction. Whether the user may unicast or multicast, the views depend on what type of application will be used. For VR/AR applications, the system uses the user information into an enhanced view (e.g., virtual reality classrooms).

IV. METHODOLOGY

A. 360-Degree Photography and Panoramic Imaging

Central to the methodology is the deployment of a specialized camera rig equipped with fisheye lenses to capture high-resolution panoramic images of the entire college campus. This involves meticulous planning to ensure comprehensive coverage of all key areas, including academic buildings, recreational spaces, and student facilities. The captured images serve as the foundation for the immersive 360-degree experience, forming the basis for creating a seamless and navigable virtual environment.

B. Image Stitching and Virtual Tour Creation

The methodology includes the use of advanced image stitching software to seamlessly integrate individual images into a cohesive 360-degree panorama. This step is crucial for ensuring a smooth transition between different views within the virtual tour. The virtual tour creation process involves the thoughtful arrangement of these panoramic images to construct a logical and user-friendly navigation path. This includes defining key points of interest and establishing intuitive pathways to guide users through the virtual exploration of the campus.

C. Integration of Multimedia Elements

An essential aspect of the methodology is the integration of multimedia elements to enhance the virtual experience. Videos, audio guides, and informational hotspots are strategically placed throughout the virtual tour to provide users with supplementary information. This step requires collaboration with content creators, ensuring that multimedia elements complement the visual narrative and contribute meaningfully to the user's understanding of the college environment.

D. User Feedback and Iterative Enhancement

The methodology incorporates a user-centric approach, involving the collection of user feedback through testing and analytics. This iterative process ensures that the virtual

International Journal of Research in Computer & Information Technology (IJRCIT),
Vol.9, Issue 1, December 2023
E-ISSN: 2455-3743
Available online at www.ijrcit.co.in

tour continually evolves based on user preferences and experiences. Feedback mechanisms, such as surveys and user analytics, play a pivotal role in refining navigation interfaces, optimizing load times, and enhancing the overall user experience.

E. Scalability and Accessibility Considerations

Scalability and accessibility are integral components of the methodology. The virtual tour is optimized to function seamlessly across a spectrum of devices, from standard web browsers to virtual reality headsets. This involves rigorous testing and optimization to accommodate various screen sizes, internet speeds, and device capabilities, ensuring a consistent and high-quality experience for users regardless of their technological context.

The "College Campus 360 Degree Virtual Shoot" project's purpose methodology is designed to fulfil its objectives by combining cutting-edge technologies with a user-centric approach. The systematic integration of immersive content, multimedia elements, and iterative enhancements ensures that the virtual tour not only meets but exceeds the expectations of diverse stakeholders, contributing to a transformative and engaging representation of the college campus.

V. HARDWARE REQUIRED

A. High-Resolution Camera Rig

A specialized camera rig equipped with high-resolution cameras and fisheye lenses is central to the project. This hardware is essential for capturing detailed and immersive 360-degree panoramic images of the entire college campus. The cameras should have the capability to capture high-quality images in varying lighting conditions to ensure a visually stunning virtual tour.

B. Computer with Powerful Processing Capabilities

A high-performance computer with robust processing capabilities is required for processing and editing the high-resolution images captured by the camera rig. This hardware should meet or exceed the system requirements of the chosen image stitching and editing software. A multi-core processor, ample RAM, and a high-end graphics card are essential components for efficient image processing.

C. Virtual Reality (VR) Devices (Optional)

While optional, the inclusion of VR devices enhances the immersive experience for users exploring the virtual tour. Compatible VR headsets, controllers, and sensors may be integrated to allow users to navigate the virtual environment in a more immersive and interactive manner. This hardware consideration aligns with the project's aim to provide a diverse range of user experiences.

VI. SOFTWARE REQUIRED

A. 360-Degree Photography Stitching Software

Specialized software for stitching together the captured 360-degree images is a crucial component. Applications like PTGui, Kolor Autopano, or Adobe Photoshop's Photo merge feature are commonly used for this purpose. This software ensures that individual images seamlessly blend to create a cohesive panoramic view, forming the foundation of the virtual tour.

B. Virtual Tour Creation Software

Virtual tour creation software is employed to assemble the stitched images into a navigable and interactive virtual environment. Platforms such as Pano2VR, Krpano, or Google Tour Creator may be utilized to structure the virtual tour, define navigation pathways, and integrate multimedia elements. This software ensures a user- friendly interface and enhances the overall user experience.

C. Multimedia Editing Tool

Multimedia elements, including videos, audio guides, and informational hotspots, require editing tools for integration into the virtual tour. Software such as Adobe Premiere Pro, Audacity, or other multimedia editing suites facilitates the creation and editing of supplementary content. These tools contribute to the project's objective of delivering an enriched and informative virtual exploration.

D. Web Development Tools

Web development tools are necessary for creating an online platform to host and deploy the virtual tour. HTML, CSS, and JavaScript are commonly employed for web development, ensuring compatibility across different browsers. Content management systems (CMS) like WordPress or custom web development may be considered based on the project's specific hosting requirements.

E. Testing and Analytics Tools

Tools for testing and analytics play a crucial role in evaluating the virtual tour's performance and gathering user feedback. Google Analytics, Hotjar, or custom analytics solutions aid in assessing user engagement, identifying navigation patterns, and collecting valuable insights for iterative enhancements. These tools contribute to the project's methodology of continuous improvement.

F. Security Considerations

In addition to the aforementioned requirements, cybersecurity tools and protocols must be implemented to secure the virtual tour platform, user data, and multimedia content. Secure socket layer (SSL) certificates, encryption methods, and regular security audits are essential components to safeguard against potential vulnerabilities.

International Journal of Research in Computer & Information Technology (IJRCIT),
Vol.9, Issue 1, December 2023
E-ISSN: 2455-3743
Available online at www.ijrcit.co.in

The hardware and software requirements outlined above form the technological backbone of the "College Campus 360 Degree Virtual Shoot" project. The careful selection and integration of these components contribute to the project's success in delivering an immersive, interactive, and technologically advanced representation of the college campus.

G. *360-Degree Photography Stitching Software*

Specialized software for stitching together the captured 360-degree images is a crucial component. Applications like PTGui, Kolor Autopano, or Adobe Photoshop's Photo merge feature are commonly used for this purpose. This software ensures that individual images seamlessly blend to create a cohesive panoramic view, forming the foundation of the virtual tour.

H. *Virtual Tour Creation Software*

Virtual tour creation software is employed to assemble the stitched images into a navigable and interactive virtual environment. Platforms such as Pano2VR, Krpano, or Google Tour Creator may be utilized to structure the virtual tour, define navigation pathways, and integrate multimedia elements. This software ensures a user- friendly interface and enhances the overall user experience.

I. *Multimedia Editing Tools*

Multimedia elements, including videos, audio guides, and informational hotspots, require editing tools for integration into the virtual tour. Software such as Adobe Premiere Pro, Audacity, or other multimedia editing suites facilitates the creation and editing of supplementary content. These tools contribute to the project's objective of delivering an enriched and informative virtual exploration.

J. *Web Development Tools*

Web development tools are necessary for creating an online platform to host and deploy the virtual tour. HTML, CSS, and JavaScript are commonly employed for web development, ensuring compatibility across different browsers. Content management systems (CMS) like WordPress or custom web development may be considered based on the project's specific hosting requirements.

K. *Testing and Analytics Tools*

Tools for testing and analytics play a crucial role in evaluating the virtual tour's performance and gathering user feedback. Google Analytics, Hotjar, or custom analytics solutions aid in assessing user engagement, identifying navigation patterns, and collecting valuable insights for iterative enhancements. These tools contribute to the project's methodology of continuous improvement.

L. *Security Considerations*

In addition to the aforementioned requirements, cybersecurity tools and protocols must be implemented to secure the virtual tour platform, user data, and multimedia content.

The hardware and software requirements outlined above form the technological backbone of the "College Campus 360 Degree Virtual Shoot" project. The careful selection and integration of these components contribute to the project's success in delivering an immersive, interactive, and technologically advanced representation of the college campus.

VII. ACKNOWLEDGMENT

We express my deepest gratitude to Govindrao Wanjari College of Engineering and Technology, Nagpur, for providing us with the invaluable opportunity to pursue and fulfill my academic aspirations.

We extend our heartfelt thanks to Dr. S. A. Chavan, our esteemed Principal, for his unwavering support and encouragement throughout the completion of this research project.

We are immensely thankful to Prof. Vivekanand P. Thakare, Head of the Department, for being a constant source of motivation, inspiration, and guidance during the course of my project.

Special appreciation goes to our guide, Prof. Nitin Thakare, whose boundless energy, creativity, and excellent coding skills served as a continuous source of motivation, ensuring the successful completion of my project work.

CONCLUSION

The "College Campus 360 Degree Virtual Shoot" project represents a transformative leap in how educational institutions present themselves to the world in the digital age. Through a harmonious fusion of cutting-edge technologies, immersive experiences, and a commitment to inclusivity, the project has not only achieved its defined objectives but has also redefined the standards of campus exploration and engagement.

Ultimately, the "College Campus 360 Degree Virtual Shoot" project contributes to shaping a forward-thinking institutional image. It positions the college at the intersection of innovation and education, showcasing a commitment to embracing technology for outreach, engagement, and recruitment. This forward-thinking image not only attracts prospective students but also strengthens relationships with existing stakeholders, including alumni, parents, and donors. In conclusion, the project's success is not solely measured by its technological achievements but by its ability to transcend physical limitations, foster global connections, and create a rich and immersive digital experience. As the institution moves forward, the "College Campus 360 Degree Virtual

Shoot" project stands as a testament to its adaptability, innovation, and commitment to providing an exceptional and accessible representation of the college campus to the world.

REFERENCES

[1] Chen, L., & Wang, D. (2018). Virtual reality in tourism: A review. Tourism Management, 67, 301-323.

[2] Jones, M., et al. (2021). Virtual Reality Campus Tours: A Critical Analysis. Journal of Higher Education Policy and Management, 43(3), 303-318.

[3] Smith, J., et al. (2020). The Impact of 360-Degree Virtual Tours on College Admissions. Journal of Interactive Marketing, 52, 69-82.

[4] Williams, A., & Johnson, B. (2019). The Role of Virtual Campus Tours in College Choice: A Case Study. Journal of Marketing for Higher Education, 29(1), 95-113.